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ABSTRACT

This study was designed to determine the amount of information obtainable when age-cluster norms (whereby student norms are available for 2- to 3-month age-group norms) are used instead of the usual grade-level norm grouping procedures. This distinction is particularly significant for studies of young children. Data included pre- and post-test scores on the Missouri Kindergarten Inventory of Developmental Skills for 12,917 Hawaiian kindergarten students and on the Peabody Picture Vocabulary Test (Revised) for 6,838 students. The two tests are used as part of the Early Provisions for School Success--a statewide kindergarten program. A parallel secondary analysis was conducted for students of limited English proficiency. For the language tests, the use of age-group norms, as opposed to sole use of cohort norms, resulted in more precise information. On the other subtests, there seems to be less need to be concerned about age-group cluster norms. Eight data tables are included. (TJH)

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How the use of age-cluster norms can reveal otherwise hidden findings

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Paper presented at the annual meeting of the
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How the use of age-cluster norms can reveal otherwise hidden findings

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A. Objectives

The purpose of the study was to determine how much more information could be obtained when age-cluster norms (whereby student norms are available for 2-3 month age-group norms) were used instead of the usual grade level norm grouping procedure in which all students, no matter what age, at a specific grade level, are measured against the same national norms. The data were collected as part of an evaluation of Early Provisions for School Success (EPSS), a statewide kindergarten program operating in the public schools of Hawai'i.

B. Perspectives/theoretical framework

For younger children, age differences of a few months may be related to differential normative achievement levels more so than would be the case for older children. For example, although it may be reasonable to have the same norms apply to high school juniors, whether born in January or June of the same school year, one can see where the performance of a 4-year, 9-month old kindergartner could be expected (normatively) to be noticeably lower than that of a 5-year, 8-month old classmate. If such age-group differences within a cohort are not taken into consideration, it is possible that important findings would be masked.

C. Method

Norms for age-group clusters covering 2-3 months were available for the Peabody Picture Vocabulary Test, Revised version (PPVT-R) and the Missouri Kindergarten Inventory of Developmental Skills (MKIDS), two tests used in the assessment portion of the EPSS program. Subtests covered auditory skills, visual skills, language, number concepts, and paper-and-pencil skills.

Overall grade-level results were compared with results which were obtained when the 2-3 month age groupings were used. Mean raw scores were converted to corresponding percentiles, which were then compared across the various age groupings.

D. Data Source

Pretest and posttest MKIDS scores were available for 12,917 Hawai'i kindergarten students (out of approximately 14,000 students statewide). Generally not all kindergarten students are posttested with the MKIDS; however, during the year of the study, all students were supposed to be pretested and posttested because state norms were being developed. This circumstance provided a one-time opportunity to conduct this part of the study with virtually the entire population.

All students were supposed to be pretested on the PPVT-R; however, only those students who scored a year or more below age-equivalence were to be posttested. This procedure resulted in 6,838 students having complete data on the PPVT.

Because of the large number of recent immigrants in the state, a parallel secondary analysis was conducted of students of limited English proficiency (SLEP). When the findings in the results section are viewed, it is important to note that the overall analyses include those in the SLEP program.

E. Results/Conclusions

Language

Results on the language subtests showed consistently large gains across age groups except for the groups that represented students older than normal for kindergarten (see Tables 1 and 2). The normal age for kindergartners in Hawai'i at posttest time ranges from about 64 months (5 years, 4 months) to about 75 months (6 years, 3 months). The students older than normal in general showed lower percentile gains. For the PPVT-R, the older-than-normal students performing at a lower level constituted about 15% of the sample. On the MKIDS, for the students up to age 6 years, 2 months at posttest time, pretest age-group means corresponded to percentiles between 21 and 27, and posttest means corresponded to percentiles between 39 and 49. The age-

group covering 6 years, 3 months to 6 years, 5 months, however, went from a mean pretest percentile of 16 to a posttest mean percentile of 27, notably below that of the younger age groups.

Table 1. **PPVT-R** Raw Score Means and Corresponding Percentiles
All Students with Pretests and Posttests

Age (in months at posttest)	N	Raw Score Mean		Percentile Rank	
		Pre	Post	Pre	Post
64 - 65	592	32	55	5	34
66 - 67	1,107	35	57	6	32
68 - 69	1,176	37	59	7	32
70 - 71	1,158	38	60	6	30
72 - 73	1,000	41	63	8	32
74 - 75	979	42	64	7	30
76 - 77	612	43	64	6	26
78 - 79	100	47	67	8	26
80 - 81	49	41	62	2	12
82 - 83	23	38	59	1	6
84 - 85	30	40	61	1	6
86 - 87	12	49	70	2	14
Total	6,838				

Table 2. **Missouri KIDS Language Skills** Raw Score Means and Corresponding Percentiles
All Students with Pretests and Posttests

Age (in months at posttest)	N	Raw Score Mean		Percentile Rank	
		Pre	Post	Pre	Post
63 - 65	1,065	9	16	27	*
66 - 68	3,315	9	16	21	39
69 - 71	3,201	10	17	23	49
72 - 74	2,975	11	17	25	43
75 - 77	2,152	11	16	16	27
78 - 80	209	12	17	*	48
Total	12,917				

* Sometimes norms were not available for children who were relatively young or relatively old.

For students of limited English proficiency, the language performance was generally lower for the older students (see Tables 3 and 4). For example, as shown in Table 3, whereas the students in the normal age range showed a mean change in percentile of from about 1 to 13 on the PPVT-R, for four of the five age groups 76 months or older, the posttest means scores did not exceed the third percentile.

Table 3. **PPVT-R** Raw Scores Means and Corresponding Percentiles
SLEP Students with Pretests and Posttests

Age (in months at posttest)	N	Raw Score Mean		Percentile Rank	
		Pre	Post	Pre	Post
64 - 65	80	19	48	1-	18
66 - 67	149	19	48	1-	14
68 - 69	150	21	49	1-	13
70 - 71	149	22	50	1-	12
72 - 73	117	24	52	1-	12
74 - 75	126	26	53	1-	11
76 - 77	76	22	48	1-	3
78 - 79	11	29	61	1-	14
80 - 81	7	28	51	1-	2
82 - 83	10	23	48	1-	1
84 - 86	8	26	49	1-	1
Total	885				

Note. For very low scores, the publisher sometimes lists the percentiles as 1-.

Table 4. **Missouri KIDS Language** Skills Raw Score Means and Corresponding Percentiles
SLEP Students with Pretests and Posttests

Age (in months at posttest)	N	Raw Score Mean		Percentile Rank	
		Pre	Post	Pre	Post
63 - 65	79	4	13	5	*
66 - 68	255	4	13	3	9
69 - 71	242	5	14	3	23
72 - 74	201	5	15	3	26
75 - 77	151	5	14	1	15
78 - 80	19	5	12	*	9
81 - 92	23	4	13	*	*
Total	970				

* Sometimes norms were not available for children who were relatively young or relatively old.

Other Test Areas

Results on the other subtests were generally consistent across normal age groups, with exceptions again occurring only for the relatively small number of students at the extremes of the age groupings (See Tables 5-8).

Table 5. Missouri KIDS **Number Concepts** Raw Score Means and Corresponding Percentiles
All Students with Pretests and Posttests

Age (in months at posttest)	N	Raw Score Mean		Percentile Rank	
		Pre	Post	Pre	Post
63 - 65	1,066	7	14	38	*
66 - 68	3,313	8	15	38	50
69 - 71	3,202	9	15	34	40
72 - 74	2,975	10	16	37	55
75 - 77	2,154	11	16	40	58
78 - 80	209	10	15	*	33
Total	12,919				

* Sometimes norms were not available for children who were relatively young or relatively old.

Table 6. Missouri KIDS **Paper/Pencil** Skills Raw Score Means and Corresponding Percentiles
All Students with Pretests and Posttests

Age (in months at posttest)	N	Raw Score Mean		Percentile Rank	
		Pre	Post	Pre	Post
63 - 65	1,069	9	19	54	*
66 - 68	3,316	10	19	48	61
69 - 71	3,201	11	19	45	54
72 - 74	2,975	12	20	45	66
75 - 77	2,154	13	20	44	60
78 - 80	209	12	19	*	46
Total	12,924				

* Sometimes norms were not available for children who were relatively young or relatively old.

Table 7. Missouri KIDS Auditory Skills Raw Score Means and Corresponding Percentiles
All Students with Pretests and Posttests

Age (in months at posttest)	N	Raw Score Mean		Percentile Rank	
		Pre	Post	Pre	Post
63 - 65	1,066	8	14	25	*
66 - 68	3,314	9	14	26	33
69 - 71	3,203	10	15	27	42
72 - 74	2,974	10	15	22	35
75 - 77	2,153	11	15	24	38
78 - 80	209	10	14	*	29
Total	12,919				

* Sometimes norms were not available for children who were relatively young or relatively old.

Table 8. Missouri KIDS Visual Skills Raw Score Means and Corresponding Percentiles
All Students with Pretests and Posttests

Age (in months at posttest)	N	Raw Score Mean		Percentile Rank	
		Pre	Post	Pre	Post
63 - 65	1,064	9	16	45	*
66 - 68	3,315	10	17	45	43
69 - 71	3,202	10	17	38	34
72 - 74	2,974	11	18	37	48
75 - 77	2,153	12	18	43	43
78 - 80	209	11	17	*	28
Total	12,917				

* Sometimes norms were not available for children who were relatively young or relatively old.

F. Conclusions

At least for language tests, the use of age-group norms as opposed to using only cohort norms results in more precise information. Pedagogical implications of the findings include a) the need to be sensitive to the different needs of the older, same-cohort students, many of whom are repeating a grade, and b) the need to realize that the overall performance of the students in the normal age groups may be masked by the relatively lower performance of their older classmates.

On the subtests other than language, there seemed to be less of a need to be concerned about age-group cluster norms. An obvious follow-up study would be the investigation of gender differences. The literature suggests that there may be major gender differences at the younger ages. The more societally-influenced gender differences may occur at older ages.

Although additional information was obtained through the use of age-cluster norms, it may not be worthwhile to try to use age-cluster norms for older students. Researchers should, however, always be aware that the typical use of norms involves treating all students in a grade as if they were the same age. Where age within a grade may make a difference, more refined analyses than are typically done may be called for.